

Extra Problem Set (10 points)

Recall the Ultimatum bargaining game that we studied in class. Two individuals would like to split \$100 and use the following procedure: Person 1 offers person 2 an amount of money $x \geq 0$ up to \$100. Then person 2 either accepts or rejects the offer x . If person 2 accepts the offer, then 1 receives the remainder of the \$100, $\$100 - x$. If person 2 rejects the offer, then *each* individual obtains \$0. Assume the amount \$100 is a continuum.

i. What is the subgame perfect equilibrium of the Ultimatum game? (1 point)

- (a) The players split \$100 evenly: $(50, \textit{Accept})$.
- (b) Player 1 offers player 2 \$1, but player 2 rejects: $(1, \textit{Reject})$.
- (c) Player 1 offers player 2 \$0, and player 2 accepts: $(0, \textit{Accept})$.
- (d) Player 1 offers player 2 \$100, and player 2 accepts: $(100, \textit{Accept})$.

Now consider the following modification of the Ultimatum game. Assume that bargaining proceeds over two periods: If player 2 rejects player 1's initial proposal, player 2 may make a counterproposal y which, if rejected by player 1, ends the game with a payoff of 0 for each player.

ii. In Figure 1, fill in the payoffs to player 1 and player 2. (1 point)

iii. What is the outcome in the subgame perfect equilibrium of the game in Figure 1? (2 points)

- (a) The players split \$100 evenly, each player gets \$50.
- (b) Player 2 gets \$100, player 1 gets \$0.
- (c) Player 1 gets \$100, player 2 gets \$0.
- (d) The game ends in a disagreement, each player gets \$0.

Now consider a further modification: Suppose that in the two-period game in Figure 1 each player suffers a cost of \$20 if an agreement is not reached in period one.

iv. In Figure 2, fill in the payoffs to player 1 and player 2. (1 point)

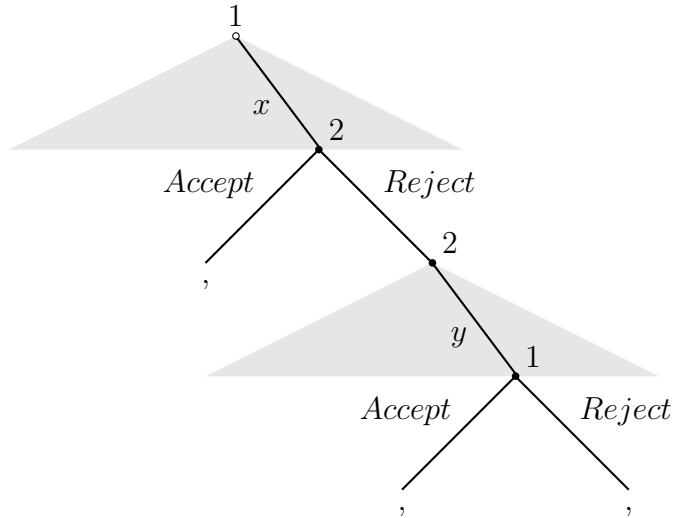


Figure 1: The two-period ultimatum game

- v. What is the equilibrium offer by player 2 to player 1 in period 2 of the game in Figure 2? (1 point)
- (a) \$0.
 - (b) \$100.
 - (c) \$50.
- vi. What is the equilibrium payoff to player 1 in period 2 of the game in Figure 2? (1 point)
- (a) 0.
 - (b) 100.
 - (c) -20.
 - (d) 50.
- vii. What is the smallest offer x that player 2 accepts in the equilibrium in period 1 of the game in Figure 2? (1 point)
- (a) 0.
 - (b) 100.
 - (c) 80.
 - (d) 50.

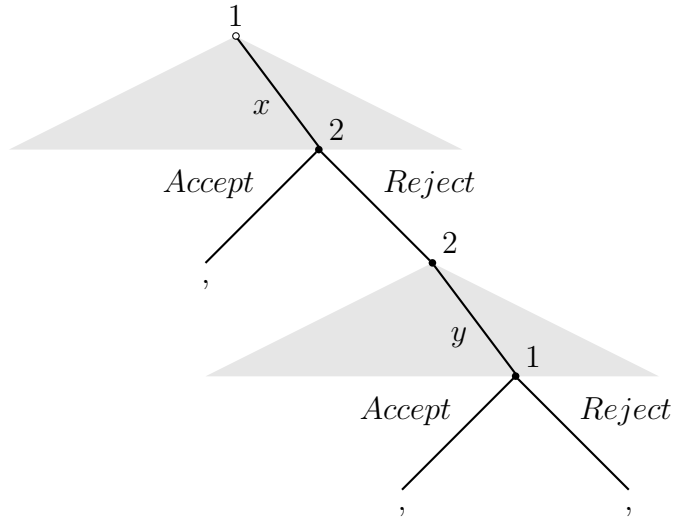


Figure 2: The two-period ultimatum game with a costly delay

- viii. What is the equilibrium offer x by player 1 to player 2 in period 1 of the game in Figure 2? (1 point)
- (a) 0.
 - (b) 100.
 - (c) 80.
 - (d) 50.
- ix. What is the outcome in the subgame perfect equilibrium of the game in Figure 2? (1 point)
- (a) The players split \$100 evenly, each player gets \$50.
 - (b) Player 2 gets \$100, player 1 gets \$0.
 - (c) Player 1 gets \$20, player 2 gets \$80.
 - (d) The game ends in a disagreement.